discs upon the face of low clouds, and visible through the whole of their intermediate course.

When the flow of spiegeleisen has ceased, the trough is moved aside and a large counterpoised arm bearing the "ladle" is swung round upon an hydraulic piston, which forms at the same time its axis and lifter. The ladle, a large lined iron pot, is adjusted under the mouth of the converter, which is now tilted a little more, till the melted metal is poured out in a thick brilliant white-hot stream accompanied from time to time with great slabs of cinder of a darker colour which float upon its surface as it pours, and form a thick scum covering the contents of the ladle. When all the fluid metal is poured into the ladle, the converter is tilted over till completely inverted, and the remaining viscous mass of cinder drops out in a glowing heap upon the floor.

During these proceedings a set of workmen have been preparing the moulds in which the ingots of steel are to be cast. These moulds are of cast-iron, nearly cylindrical, being larger at bottom than top, and open at both ends. They have lugs or handles at top by which they are lifted. They stand upon a tile, and are well packed round the bottom with sand to prevent the outflow of the melted steel. While the blow was proceeding these were arranged in an arc of a circle whose radius exactly corresponds with the length of the arm bearing the ladle.

The ladle is now swung round and adjusted till it stands directly over the first of this row of iron vases, and a plug is released by which a hole in the bottom of the ladle is opened. Through this the steel is poured into the ingot. When the first is filled the plug is closed, the ladle swung round to the second mould, and so on, till all the steel is thus cast into ingots, the size of which varies with the kind of work for which the steel is required. A thin steel plate is placed on the top of each casting immediately the mould is filled, and over this a bed of sand is placed, and speedily and firmly pressed down.

As soon as the ingots have solidified, and while they are still glowing, the moulds are lifted off them by means of an hydraulic crane, and afterwards the ingots are picked up by tongs attached to the same machinery, and are carted away, all red hot, to the hammer-shops, where they are thumped and rolled or otherwise tortured into their required forms of rails, tyres, plates, &c.

The above are the leading phenomena of the Bessemer process; the chemical actions producing them, and the changes wrought in the pig-iron and spiegeleisen, will be treated in another part of this paper.

W. MATTIEU WILLIAMS

NOTES

OWING to Mr. Lockyer having been summoned to Malta to give evidence at the court-martial on the commander of the unfortunate *Psyche* (which we regret to hear has not been saved), we are unable to give a detailed report of the proceedings of the Sicilian Eclipse Expedition. We understand that Mr. Brothers, who was stationed at Syracuse, obtained five photographs of the Eclipse during totality. One of these shows the corona "as it was never seen on glass before." At Augusta very little was seen; but at Syracuse, the southernmost station of all, the clouds which concealed the earlier stages of the Eclipse, passed away from the sun about five minutes before totality, "disclosing," writes Mr. Brothers, "a scene I shall never forget." Next week we shall hope to be able to give a complete account of the results of the Expedition, and their bearings on any increase of our knowledge of Solar Physics.

PROFESSOR CARL GUSTAV BISCHOF, who died at Bonn on the 29th of November last, was equally distinguished as a chemist and a geologist. He was born in 1792, near Nüremberg, in Bavaria, and was consequently at the time of his death in his seventy-ninth year. In 1810 he entered the University of Erlangen, where the lectures of Prof. Hildebrandt induced him to devote his study to chemistry and physics. In 1816 he succeeded to his master's position, and brought to a conclusion his "Lehrbuch der Chemie." In 1822 he removed to Bonn, in which University he occupied the position of Professor of Chemistry from that time till his death. Shortly afterwards, however, he began to pay more attention to subjects connected with chemical and physical geology, publishing a large number of treatises of sterling merit, an enumeration of which is given in the *Geological Magazine* for January. In 1841 his "Physical, Chemical, and Geological Researches on the Internal Heat of the Globe," were published in London, and in 1854 an enlarged translation of his "Lehrbuch der chemischen und physikalischen Geologie," was issued by the Cavendish Society. He was a Foreign Member of the Geological Society of London, and had received from that body the gold Wollaston medal.

THE following courses on Anatomy and Physiology at Cambridge are announced for this term:—Zoology and Comparative Anatomy, three days a week, by Prof. Newton; Anatomy and Physiology, three days a week, by Prof. Humphry; Practical Anatomy, three days a week, by Prof. Humphry and Mr. Carver; Practical Histology, by Mr. Martin, under the superintendence of Prof. Humphry, once a week, with a Microscopical Demonstration once a fortnight; Physiology, three days a week, by Dr. Michael Foster, with Practical Instruction in the Physiological Laboratory daily.

PROFESSOR P. M. DUNCAN will shortly commence a course of Lectures at King's College, London, which is open to the public, and to those who are going in for examinations. It will comprise ten lectures on the Principles of Biology in its relation to the Succession of Life on the Globe, five on Astronomical Geology, and the rest on the Principles of Geology. The course will open on Saturday, Jan. 28, at 11.30 A.M., and will be continued through the Lent, Easter, and Michaelmas terms.

DR. E. SYMES THOMPSON will deliver two lectures at the Gresham College, Basinghall Street, "On the Circulation of the Blood," on Saturday the 14th and Monday the 16th of January, at seven o'clock, which will be free to the public. It is proposed next term to continue the course "On the Organs of Respiration and Circulation in Health and Disease."

IN answer to several inquiries, we may state that the penny lectures delivered at the Hulme Town Hall by Prof. Huxley and others, to which we referred last week, are published by Messrs. Heywood, of Manchester.

WE stated in our last number the lowest temperature recorded at Blackheath during the recent frost to have been 15·3° F. on the night of December 24. More recent tables published in the *Gardener's Chronicle* give the minimum as 9·8° on the 25th. From December 22nd to January 4th the temperature at Blackheath ranged between 6·9° below the mean of fifty years, on January 4th to 18·7° below the average on December 25th. The minimum above mentioned occurred at 7 A.M. on Christmas Day, being lower than any temperature since the morning of Christmas Day 1860, when it was 8°. In the midland and eastern counties, where the cold was most severe, it is feared that much injury has been done to vegetation, especially to the evergreens. In Paris the frost has been equally intense. In a paper recently read before the French Academy of Sciences, it was stated that during December the temperature only rose above the freezing point on nine days. In the fifty years from 1816 to 1866 the average temperature for the month of December has been 3·54° above zero C. or about 38° F. The average temperature of this last December has been 1·07° below zero C. or a little above 30° F.

Engineering for Jan. 6 gives a ground plan and elevation of the proposed building for the united accommodation of the Society of Arts, Statistical Society, Royal Colonial Institute, Iron and Steel Institute, Institute of Actuaries, Ethnological Society, Anthropological Society, Photographic Society, Social Science and Law Amendment Society, Juridical Society, Victoria Institute, Royal Archæological Society, Meteorological Society, East India Association, and others which will not find a home in Burlington House. The proposal is to adapt for the purposes of these Societies the block of buildings, No. 4, Westminster Chambers, Victoria Street, together with a triangular piece of vacant ground, about a fifth of an acre, now lying waste in the rear of the Westminster Chambers. With these resources it is calculated that ample room will be obtained for the needful offices, reading-rooms, &c., as well as for libraries and museums, and a large lecture theatre capable of holding 1,200 persons.

The Meteorological Office is now issuing daily Wind Charts of the British Isles, which are published in the *Mercantile and Shipping Gazette*. The chart indicates the direction and force of the wind at a number of different stations on the coast of Great Britain and Ireland, and will be found of great value to all interested both in shipping and in meteorology.

We have received a copy of the Inaugural Lecture delivered by Prof. M'Coy at the opening of the Industrial and Technical Museum of Victoria, at Melbourne, to which is appended a short sketch of the contents of the Museum. The most important collections are illustrations of the manufacture of glass and of pottery, a series of 1,300 specimens of Victorian rocks and minerals, and 500 specimens of New Zealand rocks; a phytological collection to illustrate the natural productions of the Australian colonies, and a series of Australian ores, slates, building-stones, &c. Courses of lectures on technical subjects are delivered at the Museum.

The first number has been issued of a *Journal of the London Institution*, containing short reports of lectures which have been delivered and a programme of proceedings in the future. In future numbers it is proposed to devote considerable space to Notices of New Books presented to the General Library, to Bibliographic and Scientific Notes and Queries, and to Records of Laboratory Work.

We have received the first number of *The Quarterly Journal of the Amateur Mechanical Society*, the object of which is stated by the honorary editor, the Rev. J. Lukin, to serve as a medium of mutual information upon all points connected with mechanical manipulation. The best idea of its nature will be given by a list of the contents of the first number: The Rise and Progress of the Society; Eccentric Turning; Mensuration and Enumeration of the Impalpable and Invisible; Medallion Machine; Fancy Turning in Box-wood; and Breechloading Fire-arms. Several of the articles are illustrated.

The December number of the *American Entomologist and Botanist* completes the second volume, and the publication will now be suspended for a twelvemonth, intending to be renewed again after that period. In the meantime the botanical editor, Dr. Vasey, will conduct a botanical department in the *Journal of Agriculture*, published at St. Louis.

The Natural History Society of Montreal has just issued its Annual Report, comprising a sketch of its proceedings for the year ending May 1870. Although the number of members has decreased during the year, the Society has, nevertheless, shown considerable activity, and many valuable papers have been read at its meetings on Geology, Zoology, and general subjects, some of which have appeared in the *Canadian Naturalist*, the organ of the Society. A very important work is now contemplated by the Society outside its immediate sphere of action, viz., the dredging of the Gulf and River St. Lawrence. Application has been made to the Dominion Government for a free passage for the dredgers in one of their ordinary cruisers. It is feared, however, that this application may not be successful, and that the Society may have to draw upon its private resources for the necessary expenses.

The *Homeward Mail* gives reports of the earthquake that was felt in Scinde in October last. On October 28 two shocks are reported from various places. One report says "the earth quaked for fifteen minutes from east to west, and the people felt sea-sick while the pitching continued," and another ascribes it to the fact that the dwellers in Upper Scinde must have specially incurred the displeasure of the gods.

Heavy rains, followed by severe frost, have produced their usual effect in altering the shape of the land. We have accounts of two extensive landslips, one at Whitby and one at Mevagissey in Cornwall. At the former place, "a large part of the cliffs, supporting twelve houses, has fallen into the harbour, and it is feared that more will fall." At the latter place about 500 to 600 tons of rock were precipitated to a depth of fifty feet, and much damage was done. Exactly a year ago, in December 1869, a great landslip was reported near Nantmel in Radnorshire. The mass of earth which fell was of enormous size, and did not become stationary till it had travelled half a mile. Much damage was done, though no lives were lost.

Dr. Henri Van Heurck publishes in French, under the title of "Observationes Botanicæ et Descriptiones Plantarum novarum Herbarii Van Heurckiani," the first fasciculus of a description of new and undescribed species contained in his herbarium. The descriptions are drawn up by several eminent botanists, and the herbarium, one of the richest in the world, containing collections from all quarters of the globe, results from a fusion of those of Sieber, Baron von Reichenbach, and Dr. Van Heurck, to which numerous important additions have been made by purchase and otherwise. The volume is offered in exchange for other botanical publications.

Dr. L. Pfeiffer of Cassel, has recently published the first part of a "Synonymia Botanica locupletissima Generum Sectionum vel Subgenerum ad finem anni 1858 promulgatorum." Such a synonymy is much wanted by botanists who may be working at any particular order or genus. The value, however, for the ordinary systematist, is considerably decreased by the adoption of the singular arrangement of Endlicher in preference to those in use in Hooker and Bentham's "Genera Plantarum" or in De Candolle's "Prodromus."

Mr. Thomas Meehan read a paper before a recent meeting of the Academy of Natural Sciences of Philadelphia on the Compass Plant (*Silphium laciniatum*). He confirms the statement of earlier observers, that when the plant first comes up, and until the leaves become large and heavy, there is an unmistakeable tendency towards the north. When, however, winds and rains have once borne them in different directions, they have no power of regaining the points lost. Hence the statement made by some, that they have examined the plant in its native habitat, and found no such tendency.

The *Pharmaceutical Journal* for December 31st contains an interesting article on the trade in leeches. The annual value of the leeches imported into this country decreased from 27,068*l.* in 1853 to 7,067*l.* in 1869; the largest quantity coming formerly from Hamburg, but more recently from France. These figures probably represent an import at the present time of two million leeches annually, besides the home supply. The leeches annually employed in France may be taken at thirty millions, the largest portion being produced at home. The South and West of France and North of Africa still produce enormous quantities.

A farmer in the neighbourhood of Bordeaux has recently converted waste land worth 300 francs per annum into enclosures for leeches, which now bring him in 25,000 francs annually. Besides the well-known brown and green leeches, a communication to the Société Zoölogique d'Acclimatation of Paris, by M. de Filippi, describes a new genus, *Hæmentaria*, from Mexico and the Amazon, which possesses the valuable property of leaving no mark on the skin to which they are applied ; acting not by biting but by suction.

AN interesting paper on the introduction of Maize into China, by Dr. Hance and Mr. W. F. Mayers, appears in a recent number of the *Pharmaceutical Journal*. The authors are inclined to believe that Asia may rank as a native country of this cereal ; "the remote date assigned by Chinese records to its introduction, and the circumstance that the introducer is unknown," being, in Dr. Hance's judgment, "irreconcileable with the supposition that it was brought to this country by the Portuguese, their first arrival here under Ferdinand Perez d'Andrada being in 1517, and the earliest notice of maize in European literature dating later than 1530. Mr. Mayers gives translations of passages from Chinese authors bearing upon the subject, as well as facsimiles of early Chinese engravings of the maize and millet.

MR. EDWARD NEWMAN, in the *Field* for December 31, directs attention to the fact that during 1870 there has been an unusual immigration of quails to this country, and that a still more unusual number have stayed to breed; and desires to acquire materials for what he terms "a census of quails" during this exceptional year. The statistics particularly desired are: The number of quails bagged, and the dates ; the number of nests found ; the number of eggs in each nest ; and especially remarks as to the period and direction of flight, both on the arrival and departure of the migrants. The occurrence of the quail in Britain in such unusual numbers is, as Mr. Newman observes, a matter of great ornithological interest.

MUCH good would accrue to our peasantry and working classes generally, if a better knowledge of the value of Nature's products were diffused amongst them. Blind prejudice prevents the proper application of a host of "unconsidered trifles." We in England might take a lesson from what is done in Sweden by a Public Society, who, during a time of scarcity of food, and for the purpose of diffusing a knowledge of the edible Fungi and Lichens of that country, prepared, published, and distributed to the public schools no less than 10,000 copies of a pamphlet on the Fungi illustrated with coloured figures, and 4,000 copies of one on Lichens illustrated by actual specimens.

THAT the *Boehmeria nivea*, or China Grass fibre, will, ere long, become a regular article of import to this country, is highly probable, both from the fact of the recent reward of the Indian Government for the invention of machinery suitable for its cleaning and preservation: and from the nature of the plant being such that the climate and soil of many of our colonies are quite suited for its culture. There is no doubt that it is well adapted for a variety of uses, and could, by careful preparation, be applied to purposes for which our present commercial fibres, though to some extent used, are nevertheless unsuited. The Chinese bestow an immense amount of care and labour upon its preparation, hence the very fine fabrics which are produced in that country. In Sumatra, also, much care is given to its cultivation and preparation : the stems are usually cut when they are about six feet high. They are sometimes allowed to dry before the fibre is taken from them, but the most common practice is to take it as soon as the stems are removed from the ground. A viscid gum is found on the stem which, in Macassar, is scraped off and used as a mild sort of arrow poison. In China three crops of the stems are usually obtained in one year, but the second crop is considered to yield the best fibre.

ON THE GEOLOGY OF NOVA SCOTIA[*]

THE author, in treating on the Laurentian Rocks of Arisaig, Nova Scotia, discovered by him in 1868, referred to the occurrence of pebbles of diorite, syenite, and granite in the conglomerates of the Lower Carboniferous area of the townships of Arisaig and Antigonish, and the highly micaceous character of their grits and sandstones. He had experienced difficulty in accounting for these appearances. It appeared singular, especially, that the mica seemed to increase in those strata in proportion as they became removed from known granites. The lithological character of the discovered Laurentian band appeared to account satisfactorily for the occurrence of those constituents of the Lower Carboniferous strata. There are some gneisses and porphyritic diorites; hornblendic rock in great variety ; serpentines, black quartzite strata with veins of quartz, with abundance of crystals of mica (some would be disposed to call them granite veins) ; white syenite with stripes of green felspar and red syenite, both very sparingly hornblendic. South of these lies a Carboniferous area which seems to overlie the Laurentian band unconformably. This area is bounded on the south by a subtriangular band of metamorphic Arisaig, or middle and upper, Silurian rocks. This band is disposed in two anticlinal folds with an intermediate synclinal. The author designates it the Antigonish Sugar-loaf Band, so named from a prominent mountain of 710 feet elevation. The extreme breadth of this band, *i.e.* N. and S., is about five miles. The axes run easterly and westerly. The S. side of the Carboniferous area referred to rests unconformably on the N. side of the northern anticlinal, the strata in contact being Lower Carboniferous conglomerates. This area extends to St. George's Bay and Cape St. George on the Gulf of St. Lawrence ; it is basin-shaped, and is said to contain seams of coal. This area may be called the Arisaig area. South of the Silurian area lies the Antigonish Carboniferous area. The lower part of this area consists of conglomerates, limestone, and gypsum. The conglomerate lies unconformably on the Silurian slates of the S. side of the southern anticlinal. The slates dip < 55° S. 5 E. ; the Lower Carboniferous conglomerates and limestones dip < 30° S. 35 W. The observations made are at variance with two theories that have been advanced by different geologists to the effect—1st, that the Upper Silurian and Devonian formations of Nova Scotia have been thrown into a few *great* folds, synclinal and anticlinal ; 2nd, that the Carboniferous and underlying Devonian or Upper Silurian formations acquired their present positions simultaneously, the mountains having had a thick Carboniferous saddle, which had been subsequently removed by denudation. This theory supposes that the Carboniferous areas of Nova Scotia had been once united with each other and those of other countries. The Nova Scotia areas that are now separated have always been so, the only connection ever existing having been merely geological.

The author discovered an interesting outcrop of Laurentian syenite in the Silurian area. This forms, in conjunction with limestone, a noticeable hill of 300 feet elevation, in the middle of the Antigonish area of Carboniferous limestone and gypsum. This syenite is seen to a large extent in direct contact with limestone of Lower Carboniferous age, having abundance of cyrtoceras, conularia, dentalium, and *Leperditia okeni*. The limestone and its fossils have not been altered by contact with the syenite, showing, as a consequence, that the syenite had its existing constitution when the limestones were formed upon it in the bottom of the sea of the Lower Carboniferous era. A specimen from the summit of the hill in the collection of rocks in the Provincial Museum is reddish, like specimens in the same collection from the Arisaig Laurentian rocks. It is more hornblendic, and shows green mica, like that of a specimen of granite from a mountain in Baddeck, Cape Breton. The author made interesting observations on supposed Laurentian rocks in the Island of Cape Breton, which lies to the N.E. of Nova Scotia, being separated from the latter by a narrow strait called the Gate of Canso. In the Nova Scotia department of the Paris Exhibition of 1867, there was a specimen of serpentine from a rock at St. Annez, Cape Breton. Prof. Wyville Thomson detected in this specimen supposed eozoönal structure. The author lately received specimens of granite from White Head, Aspy Bay, Cape Breton; and also from a position seventeen miles S., and seventy-three W. from White Head. He also referred to the existence of auriferous slates, like those of Nova Scotia, at Middle River,

---

[*] Abstract of a paper read before the Nova Scotian Institute of Natural Science by the Rev. D. Honeyman, D.C.L., F.G.S., &c., Professor of Geology in the Provincial Museum.